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Quantifying Adequacy: A Hybrid Model

Barbara M. De Luca

Introduction

Recently, increasing attention has been given to the concept of adequacy in public K-12 education. In the past, the focus was primarily on equity; that is, making sure all children who are alike are treated alike, and those who are different are treated accordingly. If adequacy is defined as having the resources to teach all children to high standards,[1] then it follows that, even if perfect equity could be achieved, the education being provided to students may be inadequate. For example, an expenditure of $4000 per regular pupil with consistent adjustments for special circumstances might be considered equitable, but if it did not provide sufficient resources to teach children to high standards, it would not be adequate. So, while many states have been under pressure to meet statutory requirements regarding equity in public education, they are now also struggling with the relationship between equity and adequacy and how to reconcile any conflicts between the them.

The focus of the efforts of those dedicated to developing ideal methods for financing public education has changed over time. After most basic finance formulas were in place, equity became the focus of funding efforts, with Brown v. Board of Education of Topeka ushering in an era of equity in school finance.[2] A number of the early school finance cases following Brown focused on interdistrict funding inequities within a state.[3]

While equity continued to be the primary focus of legal cases up through 1980s, several plaintiffs turned to education clauses in state constitutions with language not only on equity but also on efficiency. These include: the 1979 Ohio case, *Board of Education v. Walter;*[4] the 1989 Texas case, *Edgewood Independent School District v. Kirby*;[5] the 1989 Kentucky case, *Rose v. Council for Better Education*;[6] and a second case in Ohio in 1997, *DeRolph v. State of Ohio*.[7] It was this use of the "state constitution education clause strategy that led to the actual term 'adequacy' and its definition in school finance litigation of the late 1980's and throughout the 1990s."[8] Both the 1989 Rose decision in Kentucky and the 1997 DeRolph decision in Ohio defined adequacy in terms of performance outcomes– in other words, outputs rather than inputs alone. Although this was a necessary step in the effort to provide an adequate education, it is not the final step. Work on adequacy cannot stop here.

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Problem Statement

Defining adequacy is difficult. For the purposes of this article, it will be defined on three levels. First, the term itself must be defined. In layperson's terms, adequacy may be defined as, "...sufficient; a sufficiency for a particular purpose,"[9] or "the quality of being able to meet a need satisfactorily."[10] However, these definitions differ substantially from one posited by Odden and Picus: "...The notion of adequacy is the provision of a set of strategies, programs, curriculum, and instruction and their full financing, that is sufficient to teach student to high standards."[11] The generic definitions would suggest a minimal level of achievement while the school finance definition advances a high level of student performance.

Second, once the term is defined, an instructional delivery system that will sustain the chosen level of adequacy must be identified, such as the curriculum and pupil-teacher and pupil support-staff ratios necessary to meet the designated standards at each grade level. Third, once the term is defined and the instructional delivery system specified, costs must be assigned to the components of the delivery system. The end product will be a dollar value per pupil necessary to provide an adequate education. Hence, the challenge of achieving adequacy is primarily definitional: 1) definition of the basic term, 2) definition of an instructional delivery system consistent with the characterization of the basic term; and 3) definition or quantification of the per pupil cost of the instructional delivery system.

Until all three steps are completed, there is insufficient direction for state general assemblies to design state funding programs to adequately allocate money to local school districts. If, in fact, the courts and the public are going to hold states more accountable for school funding formulas which provide for an adequate, as well as an equitable, education to all, it is imperative that we proceed beyond the initial definition stage and develop a method for quantifying adequacy as an input, rather than simply as an outcome. Although many efforts have been made toward this end, a model is still needed that is simple enough for the public to understand; flexible enough not only to implement but to adjust to changing standards; and accurate enough to reflect actual costs.

Purpose of the Paper

The purpose of this paper is to propose a method for quantifying adequacy. Data from the State of Ohio are used to illustrate the strategy employed. Presently, Ohio has completed the first definitional phase, that of defining adequacy in terms of performance criteria, and has a proposal for the second stage, defining an instructional delivery system. The goal of this study is to assign dollars values to the task of meeting performance outcomes using Ohio's legislatively defined standards and a proposed instructional delivery system. The method proposed herein for quantifying adequacy is a hybrid strategy in that it utilizes elements of two of the current approaches to allocate dollars in site-based model similar to that of the Seattle School District[12] and the "basket" of essential learning resources developed by the Ohio Coalition for Equity & Adequacy.[13]

Current Efforts to Quantify Adequacy

Currently, four approaches are employed to calculate the cost of an adequate education: one statistically based; a second empirically based; and a third based on professional judgment.[14] The fourth is called the Odden-Picus Adequacy Index, and is based upon the McLoone Index.[15]

The first approach draws conclusions based on the use of statistical analysis, primarily multiple regression. This approach, referred to as a cost function analysis, allows the researcher to control for the multitude of variations which exist in assigning costs to the components of education, such as the differences in students, e.g., developmentally disabled, limited English proficient, or differences in environmental settings, such as urban, rural, suburban. This method, however, has provided results that intuitively are indefensible. For example, Reschovsky and Imazeki developed an index for costing out an adequate education in Wisconsin that, based upon calibrating the average per pupil expenditure to 100, calculated the range of school districts' indices from 48.9, less than half the mean to 460, slightly more than four and one-half times the mean.[16, 17] In a similar study, using New York state data, Duncombe and Yinger concluded "that large central districts must spend two to three times as much as the average district to reach the same performance standard."[18] Obvious problems with this approach include the feasibility of a state funding districts within it boundaries at such different levels while maintaining the equity so long fought for in many states. Also, the accuracy of a method that results in such major discrepancies from district to district is questionable. Finally, this method is not designed to be understood by nonresearchers or statisticians.

A second approach to determining the cost of an adequate education involves drawing conclusion from data derived by empirical observation. This approach identifies school districts labeled as adequate with respect to performance criteria and accepts the expenditure level of such districts as adequate. The most recent attempt at assigning a cost out an adequate education in Ohio utilized this approach. This approach leaves much room for individual interpretation and subjective judgment on the part of the researchers calculating the dollars.

Augenblick has used this approach in Ohio in earlier efforts to quantify adequacy. He established a panel of experts who used observed data from Ohio school districts to develop a base expenditure per pupil necessary to provide an adequate education.[19] The panel's methods included: eliminating the expenditures "not directly related to basic instructional costs for a typical pupil";[20] excluding the lowest and the highest per pupil spending districts in the state; choosing the districts which met performance criteria identified by the panel itself; and "calculating the weighted average of the base spending" in the chosen districts.[21] The results were wrought with subjective decisions, greatly impacting the final dollar value.

Based on early review and subsequent criticism, the panel later revised its procedure.

Rather than defining "wealthy" school districts by level of expenditure per pupil, essentially the independent variable in the study, the panel redefined wealth as income and property value. Second, instead of using self-identified performance outcomes as an outcome definition of adequacy, the panel used state-designed standards. The use of state standards also addressed the criticism that the panel did not take into account various student characteristics when using proficiency test data for performance criteria. To address a fourth criticism, the panel reconsidered inclusion of noninstructional expenses based upon "both the reasonableness of [the district's] spending and the efficiency of their spending for expenditure subcategories, such as administration, operations, and pupil support" rather than eliminate them as unrelated to direct instruction of students.[22]

After addressing these criticisms, Augenblick determined that $3,930 per pupil was an adequate number of dollars to use as the base figure in a new foundation program "to provide an adequate education defined as meeting state proficiency test standards, with an annual inflation factors of approximately 2.8 percent for use in estimating over the next few years."[23] Then, using a series of regression models, an "excess cost" was determined for student characteristics that were known to have a significant impact on per pupil expenditures in a school district.[24] Weights were assigned for the following: three different groups of special education students; regional differences in the cost of-doing business; at-risk (low-income) students; and student transportation. These weights were used to identify a cost figure that was added to the base expenditure per pupil previously identified to determine the true cost for educating students to an adequate level. Special students found not to be significant in affecting per pupil expenditures, and therefore excluded from the study, were those enrolled in vocational courses and gifted programs.

The third approach to attaching a cost per pupil to an adequate education is described as employing professional judgment.[25] This strategy relies on professionals in a variety of specialty areas to participate in discussions regarding performance criteria in order to define adequacy, instructional delivery systems, and then the assignment of per pupil dollar values to an adequate education. Professional judgment can be used for one or all three of these tasks involved in defining adequacy. Chambers and Parrish used this design when studying the Illinois system in1992 and the Alaska system in1994.[26] However, they referred to it as the Resource Cost Model rather than the professional judgment model.[27]

Chambers and Parrish visited school buildings, examined classroom settings, conducted forums with educational and community leaders, and consulted with a variety of other professionals in order to identify the level of resources necessary to provide an "appropriate" education to all children. They gathered data by relying on their own professional expertise plus that of others and then employed statistical analysis to attach a cost to the educational inputs deemed necessary. Results of their work indicated the need for a two percent increase in funding to provide an appropriate education in Illinois and a 16 percent increase in Alaska. Ultimately, neither plan was implemented, because "policymakers tended to find the overall system somewhat incomprehensible and complex."[28]

In 1997, Guthrie and others, in an effort to ascertain the cost of an adequate education in Wyoming, utilized the professional judgment strategy by "consulting with a wide range of education experts in Wyoming and nationally, as well as reviewing all relevant research."[29] After gathering information, the researchers engaged in a series of rather simple mathematical calculations, using existing Wyoming teacher salary expenditures to arrive at a salary level for teacher compensation that they maintained would provide an adequate education. Several other costs, such as nonteaching staff compensation and instructional materials, were calculated using competitive market costs in Wyoming as much as possible or practical. By using data collected from professionals, either weights or specific dollar amounts were assigned to different student characteristics: gifted; limited English proficient; and at-risk. School and other environmental characteristics were also included in the study. To fully fund the resultant formula, with save harmless features to assure that no district would lose money due to the change, would have cost the

state $1.8 million. If school district losses in state aid were limited to five percent, the cost dropped to approximately $707,000."[30]

As can be seen from the above examples, the quantification of adequacy in terms of dollars has not been easy or particularly successful. Odden and Picus proposed yet a fourth approach called the Odden-Picus Adequacy Index.[31] Using the McLoone Index, originally designed to measure equity, they substituted a dollar value representing an "adequate" level of expenditure per pupil for McLoone's median per pupil expenditure, making it is possible to determine the percent of students in a state funded below an adequate level. By weighting expenditures according to differences in students, programs, and other factors, this method addresses adequacy as well as equity. However, the need to identify an "adequate" level of spending as a starting point is not addressed by their index.

Ohio's Efforts Toward Defining Adequacy

As a result of DeRolph, Ohio identified 27 standards to be met by every school district in the state, of which 26 must be met in order for a district to be identified as "effective."[32] Most of the standards address state proficiency test scores, but at least one looks at district graduation rate and another tracks student attendance rate. Districts meeting between 14 and 25 standards are classified as "continuous improvement" while districts that meet 9 through 13 standards are labeled "academic watch." If a district meets fewer than 9 standards, it becomes an "academic emergency." For districts at each classification below the "effective" rating, a variety of mandates is imposed in order to raise them to the "effective" level.

Collecting data in order to identify the instructional inputs necessary to meet the legislatively mandated performance standards is the next step facing Ohio in its efforts to quantify adequacy, with the 1997 calculations representing the most recent efforts at quantifying an instructional delivery system.[33] At that time, both the initial and revised calculated dollar values per pupil exceeded the revenue the state was willing or able to distribute to K-12 education. In 1999, the legislature agreed upon a foundation amount of $4,052 per pupil as the basic cost of an adequate education in Ohio for the 1999-2000 academic year, with an annual increase of 2.8 percent until 2003. In addition, adjustments to the foundation or basic cost were to be made for factors previously discussed, such as student characteristics. However, as a result of the machinations, the final dollar value had little relationship to the instructional inputs required to deliver an adequate education based on the Ohio performance standards.

Because of the snail's pace at which identification of instructional inputs was occurring in the Ohio General Assembly, the Ohio Coalition for Equity & Adequacy, representing more than 550 of Ohio's school districts, assumed the challenge.[34] Using the professional judgment approach, the Coalition convened a series town hall meetings across the state between September and October 1998 to gather input regarding the elements to be considered in a thorough and efficient system. The Coalition then sponsored an Education Congress consisting of approximately 800 people to refine the elements identified at the town meetings. In January 1999, several meetings were held "for translating the 'elements' derived by the Coalition's efforts into a "basket" of specific education resources."[35] At the same time, data were being collected from several other Ohio-based sources: an opinion poll conducted by the Ohio University Scripps School of Journalism; a survey completed by 2,492 elementary and secondary teachers; a survey administered to subject-oriented professional associations; a conference attended by 230 selected educators; and a review and analysis of all findings by national experts.[36] Using data collected as well as Ohio legislated requirements, the Coalition's final report, *Basket of Essential learning Resources for the 21st Century*, identified the elements and the level of the elements necessary for a "thorough and efficient" education.

Quantifying Adequacy: A Hybrid Model

The model proposed here defines adequacy in terms of inputs or dollars per pupil necessary to achieve the outcomes required for a school district to be termed "effective" by the Ohio performance standards. As such, this model combines components of the empirical observation model with those of the professional judgment model and applies to them to a site-based system used in the Seattle School District and to the Basket developed by the Ohio Coalition.[37] The overarching goal was to develop an algorithm for financing Ohio schools that is uncomplicated, comprehensible, and clear.

Method

Using the empirical observation method, the researcher selected the Ohio school districts that were declared effective by virtue of meeting 26 of 27 performance standards for the 1998-1999 academic year. Table 1 contains summary and descriptive information for these 30 school districts. The second step of the process involved the professional judgment approach. The Basket of Essential Learning Resources, developed through extensive use of professional judgment, was employed to determine the level of inputs necessary to meet 26 of the 27 performance standards mandated by the state. Appendix A contains the grid identifying the "basket".

Table 2 identifies the initial weights used in the Seattle School District for allocating dollars to school buildings during the earliest stage of their site-based budgeting plan. There is a basic education weight depending on the academic year of the student; five levels of weights for special education students; weights for bilingual students; and weights for students receiving free and reduced-price lunches. The last set of weights is based on test scores on the state achievement tests. Each student in grades one through three in a school where the test scores were in the 0-10th percentile was weighted an additional .05, and so forth. Later iterations of the weighting system removed weights for test scores.

The third step involved applying the weighting components of the Seattle site-based system to the statutory requirements (definition) for an adequate education in Ohio using the elements of the professional judgment model established by the Coalition. The results are depicted in Table 3. The Ohio weighting system contains a basic education weight depending on the academic year of the student; three levels of weights for special education students; weights for gifted students; and weights for students receiving free and reduced-price lunches. The last set of weights, based on test scores on the state achievement tests, was retained for intermediate, middle, and high school grades.

The final step in the analysis was first applying this weighting system to Ohio numbers and then to the "basket" of essential learning resources. The results are shown in Tables 4 and 5 respectively. The basic foundation amount of $3851 per pupil was used because that was the actual guaranteed amount per pupil in Ohio for the 1998-1999 academic year. The general formula is provided in the left-hand column and the application to an actual Ohio school district is presented on the right side of the table. Table

Table 1
Effective Ohio School Districts, 1998-1999: Descriptive and Summary Information

School District	Expenditure/ Pupil	1995 Average Income	Property Value/Pupil	Total ADM	Average Teacher Salary	Average Years Experience
Aurora City	$6,004	$64,102	$160,037	1,987	$47,973	15.70
Bay Village City	6,660	62,920	133,351	2,480	46,345	16.50
Beachwood City	11,877	91,290	343,728	1,564	55,825	17.00
Bexley City	7,404	93,064	121,981	2,366	51,175	16.50
Brecksville-Broadview Heights	6,260	54,844	170,862	3,892	45,792	12.60
Centerville City	5,903	35,958	155,414	7,278	43,601	15.60
Chagrin Falls Ex. Village	6,808	100,178	168,143	1,885	47,525	16.10
Cuyahoga Heights Local	10,595	38,249	577,762	772	53,201	17.50
Forest Hills Local	4,858	60,268	115,307	7,992	45,442	15.40
Fort Recovery Local	4,568	29,687	53,534	993	34,835	15.70
Granville Exempted Village	5,272	60,761	130,270	1,615	43,225	16.70
Independence Local	8,608	46,954	392,453	952	48,352	14.10
Indian Hills Exempted Village	8,379	194,061	331,708	2,050	43,583	10.40
Kenston Local	5,676	61,130	127,691	3,024	43,099	12.90
Madeira City	4,192	54,031	117,441	1,498	42,881	14.40
Mariemont City	6,620	56,831	121,738	1,707	43,150	13.70
Marion Local	4,186	32,123	46,265	981	36,981	15.90
Mason City	4,894	44,925	94,012	4,746	37,645	8.60
New Knoxville Local	4,573	26,570	65,917	498	33,665	15.00
Oakwood City	6,945	80,084	129,907	1,767	42,103	13.90
Olmsted Falls City	6,130	37,875	89,406	2,963	44,383	14.00
Orange City	10,132	166,769	313,181	22,32	52,338	15.10
Ottawa Hills Local	8,032	120,861	130,068	974	48,251	16.30
Pickerington Local	5,404	48,218	73,185	6,646	44,736	13.40
Revere Local	5,989	83,107	201,270	2,844	43,082	14.80
Solon City	7,595	60,344	184,366	4,699	48,216	13.00
South Range Local	4,651	34,677	72,579	1,230	36,908	15.10
Upper Arlington City	8,532	75,415	181,875	5,519	50,100	16.70
Westlake City	7,680	62,518	237,340	3,635	47,695	15.60
Wyoming City	6,678	79,664	102,643	1,797	45,227	12.40
Group Average	6,704 *6,241	68,649	171,448	2,753	44,911	14.69
Ohio Average	4,640	35,958	91,750	2,953	39,836	14.60

*Group average without the three grayed figures.
Source: Ohio Department of Education.

Table 2
Assigned Weightings of the Formula: Seattle Plan

Grade Levels	Basic Ed*	Special Education					Bilingual	Test Scores			F & R Lunch
		Lev 1	Lev 2	Lev 3	Lev 4	Lev 4B		0-10%	11-20%	21-30%	
Pre-School**	0	0.92	.092	1.51	1.51	4.00	0.00	0	0	0	0
Kindergarten-Half	0.5	0.28	0.49	1.34	1.90	3.88	0.13	0	0	0	0.087
Kindergarten-Full	1.0	0.57	0.98	2.68	3.80	7.76	0.26	0	0	0	0.087
Primary (1-3)	1.0	0.57	0.98	2.68	3.80	7.76	0.26	.05	.03	.02	0.087
Intermediate (4-5)	0.94	0.57	0.98	2.49	3.80	7.76	0.26	.05	.03	.02	0.087
Middle School (6-8)	0.87	0.57	0.98	1.43	3.74	7.70	0.41	.05	.03	.02	0.18
High School (9-12)	0.88	0.57	0.98	1.08	3.74	7.70	0.42	.12	.08	.04	0.109

* Refers to Basic Education funds or state aid.
**Pre-school does not generate Basic Education funds.

Source: James Olchefske, "A Student Funding Plan for Equity and Achievement: Seattle School District Weighted Student Formula," Paper presented to the Annual Meeting of the American Education Finance Association, Seattle, Washington, March 1999.

Table 3
Assigned Weightings of the Formula: Ohio

Grade Levels	Basic Ed*	Special Education			Test Scores			F& R Lunch	Gifted Ed
		Lev 1	Lev 2	Lev 3	0-10%	11-20%	21-30%		
Kindergarten	.57	0.22	0.22	3.01	0	0	0	0.087	.00
Primary (1-3)	1.15	0.22	0.22	3.01	0	0	0	0.087	.01
Intermediate (4-5)	1.08	0.22	0.22	3.01	.05	.03	.02	0.087	.01
Middle School (6-8)	1.00	0.22	0.22	3.01	.05	.03	.02	0.087	.01
High School (9-12)	1.01	0.22	0.22	3.01	.05	.03	.02	0.087	.01

* Refers to Basic Education funds or state aid.

5 illustrates the algorithm employed for the elements in the Coalition Basket. As in Table 4, the formula is provided in the left-hand column and the application to one school district is presented on the right side of the table.

Results

Table 7 displays the per pupil results for each of the 30 school districts in the sample. The column entitled "Coalition" shows the dollar values derived via the formula in Table 5 while the column entitled "Weighted" depicts the dollar values calculated via the formula in Table 4. Several features are notable. There are no districts with extremely high costs per pupil like those seen in Table 1. Also, some differences between the numbers are small, as in Kenston Local, while others are rather large, as for New Knoxville Local. There does not appear to be a pattern in the findings. For some, the Coalition number is greater, e.g., Aurora City, Bay Village City, Beachwood City, and Bexley City; while, for others, the Weighted dollar values are greater, like Breckville-Broadview Heights, Fort Recovery Local, and Mason City.

Conclusions

The purpose of this paper was to propose a hybrid method for quantifying adequacy. For the purposes of this study, adequacy was defined on three levels: 1) definition of the basic term, 2) definition of an instructional delivery system consistent with the characterization of the basic term; and 3) definition or quantification of the per pupil cost of the instructional delivery system. Four current approaches of calculating the cost of an adequate education were reviewed: one statistically based; a second empirically based; a third based on professional judgment; and a fourth, an adequacy index based upon the McLoone Index. The model proposed in this article defined adequacy in terms of inputs or dollars per pupil necessary to achieve the outcomes required for a school district to be termed "effective" by the Ohio performance standards. Components of the empirical observation model were combined with those of the professional judgment model and applied first to a site-based system used in the Seattle School District. and then to the "basket" of essential learning resources developed by the Ohio Coalition. The overarching goal was to develop a system for financing Ohio schools that is uncomplicated, comprehensible, and clear.

The results of the analysis indicated clearly that the weighted model is much less complicated, less elusive, and easier to grasp, both conceptually and practically, than the Coalition "basket". The results

Table 4
General Formula with Assigned Weightings for Ohio and School District Example

General Formula	*Example: Aurora School District*
Kindergarten	
(a) = (Half # Students K x .57) x (Foundation)	159 x .57 = 79.50 x $3851 = **$306,154.50**
Grades 1-3	
(b) = (# Students 1-3 x 1.15) x (Foundation)	476 x 1.15 = 547.40 x $3851 = **$2,108,037.40**
Grades 4-5	
(c) = (# Students 4-5 x 1.08) x (Foundation)	319 x 1.08 = 344.52 x $3851 = **$1,326,746.52**
Grades 6-8	
(d) = (# Students 6-8 x 1.0) x (Foundation)	444 x 1.0 = 444.00 x $3851 = **$1,709,844.00**
Grades 9-12	
(e) = (# Students 9-12 x 1.01) x (Foundation)	586 x 1.01 = 591.86 x 3851 = **$2,279,252.86**
Subtotal for Regular Students	
(a) + (b) + (c) + (d) + (e) = Dollars for Regular Students	$306,154.50 + $2,108,037.40 + $1,326,746.52 + $1,709,844.00 +$2,279,252.86 = **$7,730,035.2**
Special Education Students	
Category 1	
(f) = (# SE Students Category 1 x .22) x (Foundation)	118.26 x .22 = 26.02 x $3851 = **$100,192.24**
Category 2	
(g) = (# SE Students Category 2 x .22) x (Foundation)	16 x .22 = 3.52 x $3851 = **$13,555.52**
Category 3	
(h) = (# SE Students Category 3 x 3.01) (foundation)	3 x 3.01 = 9.03 x $3851 = **$34,774.53**
Subtotal for Special Education Students	
(f) + (g) + (h) = Dollars for Special Education Students	$100,192.24 + $13,555.52 + $34,774.53 = **$148,522.29**
Gifted Students	
(i) = (# Gifted Students x .01) x (Foundation)	365 x .01 = 3.65 x $3851 = **$14,056.15**
At-Risk Students (Free and Reduced-Price Lunch Recipients)	
(j) = (# At-Risk Students x .087) (Foundation)	29.21 x .087 = 2.54 x $3851 = **$9,781.54**
Total	
(a) + (b) + (c) +(d) + (e) + (f) + (g) + (h) + (i) + (j) = Total Dollars	$7,730,035.28 + $148,522.29 + $14,056.15 + $9,781.54 = **$7,902,395.26/1987**
Adjusted Per Pupil Amount	
Total Dollars/Enrollment	**$3,977.05**

suggest that the efforts toward defining adequacy might promote equity as well. Furthermore, the results of using the weighted model as a prototype for Ohio data do not demonstrate substantial drawbacks at this time. Further analyses to statistically test the degree of similarities and differences need to be completed. However, this hybrid model shows potential for eliminating several of the barriers to interpreting adequacy in terms of expenditure per pupil.

Endnotes

1. See, Allan R. Odden and Lawrence O. Picus, *School Finance: A Policy Perspective* (Boston, Massachusetts: McGraw-Hill Companies, 2000).
2. *Brown v. Board of Education of Topeka*, 347 U.S. 483 (1954).
3. See, *McInnis v. Shapiro*, 293 F. Supp. 327 (N.D. Il. 1968); *Burruss v. Wilkerson*, 310 F.Supp. 572 (W.D. Va. 1969); and *Robinson v. Cahill*, 303 A2d 273 (N.J. 1973).
4. *Board of Education v. Walter*, 390 N.E.2d 813 (Ohio 1979).
5. *Edgewood Independent School District v. Kirby*, 7777 S.W.2d 391 (Tex. 1989).
6. *Rose v. Council for Better Education*, 790 S.W.2d 186 (Ky. 1989).
7. *DeRolph v. State of Ohio*, 677 N.E. 2d 733 (Oh. 1997).
8. Odden & Picus (2000) p.38.
9. *Webster's Revised Unabridged Dictionary* (MICRA, Inc., 1998) <http://www.dictionary.com/>.
10. *WorldNet* (Princeton University, 1997) <http://www.dictionary.com/>.
11. Odden & Picus (2000) p.69.
12. Joseph Olchefske, *"A Student Funding Plan for Equity and Achievement: Seattle School District Weighted Student Formula,"* Paper presented to the Annual Meeting of the American Education Finance Association, Seattle, Washington, March 1999.
13. *Ohio Coalition for Equity & Adequacy, Basket of Essential Learning Resources for the 21st Century* (Columbus, Ohio: October 1999).

Table 5
General Formula for Ohio and School District Example Using the Coalition Basket

General Formula	*Example - Aurora School District*
Kindergarten - Grade 3	
(a) $\frac{\text{\# Students K-3}}{19}$ x (Average teacher compensation) = Dollars for K-3 Teaching	556/19 = 29 x $60,000 = **$1,740,000.00**
Grades 4-8	
(b) $\frac{\text{\# Students 4-8}}{22}$ x (Average teacher compensation) = Dollars for 4-8 Teaching	763/22 = 34.68 x $60,000 = **$2,080,800.00**
Grades 9-12	
(c) $\frac{\text{\# Students 9-12}}{24}$ x (Average teacher compensation) = Dollars for 9-12 Teaching	586/24 = 24.42 x $60,000 = **$1,465,200.00**
Subtotal for Regular Teaching	
(a) + (b) + c) = Dollars for Regular Teaching	$1,740,000 + $2,080,800 + $1,465,200 = **$5,286,000.00**
Special Education	
Category 1	
(d) $\frac{\text{\# Students 1}}{16}$ x (Average teacher compensation) = Dollars for Teaching Special Ed 1	118.26/16 = 7.39 x $60,000 = **$443,400.00**
Category 2	
(e) $\frac{\text{\# Students 2}}{16}$ x (Average teacher compensation) = Dollars for Teaching Special Ed 2	16/16 = 1 x $60,000 = **$60,000**
Category 3	
(f) $\frac{\text{\# Students 3}}{16}$ x (Average teacher compensation) = Dollars for Teaching Special Ed 3	3/16 = .19 x $60,000 = **$11,400.00**
Subtotal for Special Education Teaching	
(d) + (e) + (f) = Dollars for Special Education Teaching	$443,400 + $60,000 + $11,400 = **$514,800.00**
Gifted Teaching	
(g) $\frac{\text{\# Gifted Students}}{15}$ x (Average Teacher Compensation) = Dollars for Teaching Gifted	365/15 = 24.33 x 60,000 = **1,460,000**
At-Risk Teaching (Free and Reduced-Price Lunch Recipients)	
(h) (# At-Risk Students x .08) ($3851) = Dollars for Teaching At-Risk	29.21 x .08 = 2.34 x 3851 = **8,999**
Teachers: Music, Art, Physical Education	
(i) $\frac{\text{\# of Students x 3}}{500}$ x (Average Teacher Compensation)	1987/500 = 3.97 x 3 = 12 x 60,000 = **720,000**
Total	
(a) + (b) + (c) +(d) + (e) + (f) + (g) + (h) + (i) + (j) = Total Dollars	$5,286,000 + $514,800 + $1,460,000 + $8,999 = **$7,269,799**
Adjusted Per Pupil Amount	
Total Dollars/Enrollment	**$3,658.68**

14. James W. Guthrie and Richard Rothstein, "Enabling 'Adequacy' to Achieve Reality: Translating Adequacy Into State School Finance Distribution Arrangements," In Helen F. Ladd, Rosemary Chalk, and Janet S. Hansen, Eds., *Equity and Adequacy in Education Finance: Issues and Perspectives* (Washington, D.C.: National Academy Press, 1999).

15. Odden and Picus (2000).

16. Andrew Reschovsky and Jennifer Imazeki, "The Development of School Finance Formulas to Guarantee the Provision of Adequate Education to Low-Income Students," In William F. Fowler, Ed., *Developments in School Finance 1997* (Washington, D.C.: U.S. Department of Education, National Center for Educational Statistics, 1998) p. 135.

17. The Milwaukee Public Schools had the highest index in the Reschovsky and Imazeki study.

18. William D. Duncombe and James M. Yinger, "Performance Standards and Educational Cost Indexes: You Can't Have One Without the Other", In Ladd et al. (1999) p. 261.

19. See, John Augenblick, *"Testimony of Dr. John Augenblick to the Task Force on School Funding"* (Denver, Colorado: Augenblick & Meyers, June 10, 1997).

20. Augenblick (June 10, 1997) p. 2.

Table 6
Comparison of Coalition vs. Weighted Results

School District	Per Pupil Cost of Teaching for Adequacy	
	Coalition	Weighted
Aurora City	$4,150	$3,999
Bay Village City	4,205	3,990
Beachwood City	4,768	4,018
Bexley City	4,534	4,015
Breckville-Broadview Heights	3,906	3,949
Centerville City	4,290	4,000
Chagrin Falls Exempted Village	4,522	4,006
Cuyahoga Heights Local	4,631	4,009
Forest Hills Local	4,148	3,988
Fort Recovery Local	3,199	3,945
Granville Exempted Village	4,721	4,004
Independence Local	4,917	3,965
Indian Hills Exempted Village	3,445	3,789
Kenston Local	4,045	4,018
Madeira City	4,326	3,952
Mariemont City	3,449	3,977
Marion Local	4,816	4,389
Mason City	3,269	3,949
New Knoxville Local	3,000	4,018
Oakwood City	3,526	4,013
Olmstead Falls City	3,373	4,013
Orange City	4,980	3,975
Ottawa Hills Local	4,965	3,998
Pickerington Local	4,354	3,981
Revere Local	3,485	3,988
Solon City	5,113	4,042
South Range Local	2,933	4,023
Upper Arlington City	4,363	4,005
Westlake City	3,720	4,026
Wyoming City	4,849	3,982

21. Augenblick (June 10, 1997) p. 3.
22. Augenblick (June 10, 1997).
23. John Augenblick, *Recommendations for a Base Figure and Pupil-Weighted Adjustments to the Base Figure for Use in a New School Finance System in Ohio*, Report prepared for the School Funding Task Force (Columbus, Ohio: Ohio Department of Education, July 17, 1997) pp. 10-11.
24. Augenblick (July 17, 1997) p. 19.
25. Guthrie and Rothstein (1999), p. 220.
26. Jay G. Chambers and Thomas B. Parrish, "State Level Education Finance," In W.S. Barnett, Ed., *Cost Analysis for Education Decisions: Methods and Examples, Advances in Educational Productivity, Vol. 4* (Greenwich, Connecticut: JAI Press, 1994).
27. The Resource Cost Model is explained in detail in their earlier work. See Jay G. Chambers and Thomas B. Parrish, *Adequacy and Equity in State School Finance and Planning: A Resource Cost Model Approach* (Stanford, California: Institute for Research on Educational Finance and Governance, March 1983).
28. Chambers and Parrish (1994) p. 72.
29. This study is often referred to as the "MAP study, " MAP being an acronym for the consulting firm of Management, Analysis, and Planning Associates, L.L.C. See, James W. Guthrie, Gerald C. Hayward, James R. Smith, and Richard Rothstein, *A Proposed Cost-Based Block Grant Model for Wyoming School Finance*, Report submitted to Joint Appropriations Committee of the Wyoming Legislature (April 1997) p. 29 <http://legisweb.state.wy.us/school/cost/apr7/exec.htm>.
30. Guthrie et al. (April 1997) p. 70.
31. Odden and Picus (2000).
32. See Ohio Proficiency Tests-Update Center (2000) <http://www.state.oh.us/proficiency/index.htm>.
33. Augenblick (June 10, 1997); Augenblick (July 17, 1997).
34. The mission of the Coalition for Equity & Adequacy, hereafter referred to as the Coalition, is to pursue efforts to achieve equity and adequacy in school funding across the state, founded on the Ohio constitutional mandate of a "thorough and efficient system of common schools." The work of the Coalition is focused on testing the constitutionality of the Ohio school funding system. The Coalition is supported by its member districts, with each paying approximately $.50 per pupil annually.
35. For the results of data collection and analysis, see *Ohio Coalition for Equity & Adequacy, Basket of Essential Learning Resources for the 21st Century* (Columbus, Ohio: October 1999).
36. *Ohio Coalition for Equity & Adequacy* (October 1999) p. 13.
37. Olchefske (March 1999).

APPENDIX A - Basket of Essential Learning Resources Grid

Grade Level	*Grades PreK - 3*	*Grades 4 - 8*	*Grades 9 - 12*
I. CURRICULUM			
A. Primary and Middle/Jr. High			
1. Full Day Kindergarten	**Essential**		
2. 1/2 day state-supported pre-school option for 4-year-olds	**Essential**		
3. reading	**Essential**	**Essential**	
4. writing	**Essential**	**Essential**	
5. mathematics	**Essential**	**Essential**	
6. social studies	**Essential**	**Essential**	
7. science	**Essential**	**Essential**	
8. English	**Essential**	**Essential**	
9. Foreign Language	**Essential**	**Essential**	
10. art	**Essential**	**Essential**	
11. music (vocal and instrumental)	**Essential**	**Essential**	
12. health/physical education	**Essential**	**Essential**	
13. career awareness/orientation/exploration	**Essential**	**Essential**	
14. technology	**Essential**	**Essential**	
15. advanced placement opportunities	**Essential**	**Essential**	
16. performing arts (drama/theater, dance)		**Essential**	
17. work and family life		**Essential**	
18. industrial technology		**Essential**	
B. High School		**Essential**	minimum number of courses
1. English/language arts		**Essential**	7 courses*
2. mathematics		**Essential**	7 courses*
3. science		**Essential**	7 courses*
4. social studies		**Essential**	7 courses*
5. foreign language			3 courses of at least 1 unit of credit each in 3 languages
6. health/physical education			2 courses
7. business/technology			5 courses
8. music (vocal and instrumental)			8 courses (4 credits)
9. art (visual, drama/theater, dance)			3 courses
10. industrial technology			2 courses
11. work and family life			4 courses
12. vocational (career-technical education)			20 courses
13. advanced placement			**1 course in each of: mathematics, social studies, science and English, in addition to 7 other courses
14. electives			7 courses
C. Flexibility is essential at all grade levels for students with disabilities, gifted and disadvantaged students.	**Essential**	**Essential**	**Essential**

**minimum four courses of at least 1 unit of credit each*

APPENDIX A - Basket of Essential Learning Resources Grid Continued

Grade Level	*Grades PreK - 3*	*Grades 4 - 8*	*Grades 9 - 12*
II. PROGRAMS/SERVICES			
A. Special education	**Essential**	**Essential**	**Essential**
B. Psychological services	**Essential**	**Essential**	**Essential**
C. Speech Pathology	**Essential**	**Essential**	**Essential**
D. Hearing services	**Essential**	**Essential**	**Essential**
E. Audiology services	**Essential**	**Essential**	**Essential**
F. Vision services	**Essential**	**Essential**	**Essential**
G. Occupational therapy	**Essential**	**Essential**	**Essential**
H. Physical therapy	**Essential**	**Essential**	**Essential**
I. Gifted pupil education	**Essential**	**Essential**	**Essential**
J. Compensatory programming for disadvantaged	**Essential**	**Essential**	**Essential**
K. Guidance and counseling including career planning	**Essential**	**Essential**	**Essential**
L. Nursing	**Essential**	**Essential**	**Essential**
M. Social	**Essential**	**Essential**	**Essential**
N. Conflict resolution training for students	**Essential**	**Essential**	**Essential**
O. Library/media	**Essential**	**Essential**	**Essential**
P. Visiting teacher	**Essential**	**Essential**	**Essential**
Q. Attendance personnel	**Essential**	**Essential**	**Essential**
R. Food	**Essential**	**Essential**	**Essential**
S. Transportation	**Essential**	**Essential**	**Essential**
T. Student testing	**Essential**	**Essential**	**Essential**
U. Tutoring	**Essential**	**Essential**	**Essential**
V. Services for English as a Second Language students	**Essential**	**Essential**	**Essential**
W. Proficiency intervention services	**Essential**	**Essential**	**Essential**
X Supervision for education operations	**Essential**	**Essential**	**Essential**
Y. Security	**Essential**	**Essential**	**Essential**
Z. Community/facility use	**Essential**	**Essential**	**Essential**
AA. Communications services	**Essential**	**Essential**	**Essential**
BB. Parent support services	**Essential**	**Essential**	**Essential**
CC. Vocational education (career-technical education) services			**Essential**
DD. Access to business partnerships	**Essential**	**Essential**	**Essential**
EE. Extra-curricular activities		**Essential**	**Essential**
FF. Field trips	**Essential**	**Essential**	**Essential**

APPENDIX A - Basket of Essential Learning Resources Grid Continued

Grade Level	*Grades PreK - 3*	*Grades 4 - 8*	*Grades 9 - 12*
III. DELIVERY SYSTEMS			
A. Facilities 1. Teaching Areas			
a. regular classroom	**Essential**	**Essential**	**Essential**
b. special education	**Essential**	**Essential**	**Essential**
c. vocational education (career-technical)			**Essential**
d. music (vocal and instrumental)	**Essential**	**Essential**	**Essential**
e. art	**Essential**	**Essential**	**Essential**
f. drama/auditorium		**Essential**	**Essential**
g. science laboratories	**Essential**	**Essential**	**Essential**
h. gymnasiums	**Essential**	**Essential**	**Essential**
i. Libraries (including INFOhio connectivity)	**Essential**	**Essential**	**Essential**
j. multi-media computer laboratories	**Essential**	**Essential**	**Essential**
1) industrial technology		**Essential**	**Essential**
2) work & family life		**Essential**	**Essential**
3) business education		**Essential**	**Essential**
k. foreign language labs		**Essential**	**Essential**
l. distance learning	**Essential**	**Essential**	**Essential**
m. tutoring	**Essential**	**Essential**	**Essential**
n. small group instruction	**Essential**	**Essential**	**Essential**
2. Support areas	**Essential**	**Essential**	**Essential**
a. counseling	**Essential**	**Essential**	**Essential**
b. clinic	**Essential**	**Essential**	**Essential**
c. parent conference	**Essential**	**Essential**	**Essential**
d. clerical	**Essential**	**Essential**	**Essential**
e. administration	**Essential**	**Essential**	**Essential**
g. cafeteria/kitchens	**Essential**	**Essential**	**Essential**
h. multi-media computer networks with at least a T1 connection	**Essential**	**Essential**	**Essential**
B. Equipment and Materials			
1. textbooks	replace every 5 years	replace every 5 years	replace every 5 years
2. workbooks	New each year	New each year	New each year
3. multi-media computers	1 per every 5 students	1 per every 5 students	1 per every 5 students
4. multi-media computers software	replace every 5 years	replace every 5 years	replace every 5 years
5. multi-media computer printers	2 per classroom	2 per classroom	2 per classroom
6. multi-media computer scanners	1 per classroom	1 per classroom	1 per classroom
7. multi-media computer systems	budget a per pupil amount annually	budget a per pupil amount annually	budget a per pupil amount annually
8. calculators	As required	As required	As required
9. televisions/VCR	1 per classroom	1 per classroom	1 per classroom
10. overhead projectors	1 per classroom	1 per classroom	1 per classroom
11. science materials	As per model curriculum	As per model curriculum	As per model curriculum
12. library collections	1 per building	1 per building	1 per building
13. videos	replace every 5 years	replace every 5 years	replace every 5 years
14. classroom supplies	essential	essential	essential
15. telephone systems	1 per classroom	1 per classroom	1 per classroom
16. instruments for music education	essential	essential	essential

APPENDIX A - Basket of Essential Learning Resources Grid Continued

Grade Level	*Grades PreK - 3*	*Grades 4 - 8*	*Grades 9 - 12*
C. Professional Staff Development			
1. licensed/certified personnel	10 days per year	10 days per year	10 days per year
2. support staff	5 days per year	5 days per year	5 days per year
3. substitutes	2 days per year	2 days per year	2 days per year
D. Evaluation Resources			
Provide each student with:			
1. personal plan for progress	**Essential**	**Essential**	**Essential**
2. staff advisor		**Essential**	**Essential**
3. assessment for job			**Essential**
Each teacher should have:			
1. time to advise students	**Essential**	**Essential**	**Essential**
2. peer evaluation	**Essential**	**Essential**	**Essential**
3. peer collaboration	**Essential**	**Essential**	**Essential**
E. Staffing			
1. Number of Pupils per Teacher *			
a. primary grades (preK-3) regular	18-20:1		
b. primary grades (preK-3) poverty	15:1		
c. intermediate grades (4-5,4-6)		22:1	
d. grades (7-8)		22:1	
e. high school (9-12)			24:1
2. Specialized Teachers			
a. physical education teachers	500:1	500:1	
b. art teachers	500:1	500:1	
c. music teachers	500:1	500:1	
d. performing arts/drama teachers			**Essential**
e. gifted teachers-self-contained classroom	15:1	15:1	15:1
f. gifted teachers, resource and intervention specialist	60:1	60:1	60:1
g. gifted coordinators	3500:1 or minimum .5 per district	3500:1 or minimum .5 per district	3500:1 or minimum .5 per district
3. Special Education Teachers			
a. teacher LD	16 max.	16 max.	22 max.
b. teacher DH	16 max.	16 max.	22 max.
c. MH/SBH/low incidence	8 max. + aide	8 max. + aide	8 max. + aide
d. supervisors	required	required	required
e. aides	As needed	As needed	As needed
f. occupational therapy	required	required	required
g. physical therapy	required	required	required
4. Special Services Personnel			
a. social workers for districts with high rates of poverty	2000:1	2000:1	2000:1
b. visiting teachers/attendance personnel	2500:1, minimum 1 per district	2500:1, minimum 1 per district	2500:1, minimum 1 per district
c. psychologists	1250:1	1250:1	1250:1
d. audiologist	available	available	available

*To compute class size count regular classroom teacher and licensed intervention specialists, but exclude educational service personnel. Class size and personnel ratios must be modified to accommodate school districts with high rates of poverty and high rates of student mobility and/or higher than average rates of students with disabilities.

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APPENDIX A - Basket of Essential Learning Resources Grid Continued

Grade Level	*Grades PreK - 3*	*Grades 4 - 8*	*Grades 9 - 12*
4. Special Services Personnel continued			
e. speech pathologists	1250:1	1250:1	1250:1
f. hearing	1250:1	1250:1	1250:1
g. vision	1250:1	1250:1	1250:1
h. librarians/media specialists	Min. 1 licensed librarian/media specialist per district + 1 high school librarian with library/media services available in each building	Min. 1 licensed librarian/media specialist per district + 1 high school librarian with library/media services available in each building	Min. 1 licensed librarian/media specialist per district + 1 high school librarian with library/media services available in each building
i. licensed Guidance Counselors	500:1	400:1	250:1
j. nurses	1500:1 + daily nursing services provided by trained nursing aides in every building	1500:1 + daily nursing services provided by trained nursing aides in every building	1500:1 + daily nursing services provided by trained nursing aides in every building
k. technology coordinator	Min. 1 per district	Min. 1 per district	Min. 1 per district
l. EMIS coordinator	Min. 1 per district	Min. 1 per district	Min. 1 per district
m. substitute teachers	**Essential**	**Essential**	**Essential**
5. Administrative Personnel			
a. Principal/Assistant Principal	500:1, Principal to serve no more than 2 buildings	500:1, Principal to serve no more than 2 buildings	500:1, Principal to serve no more than 2 buildings
6. Other Personnel			
a. Instructional Assistants	available	available	available
b. Clerical Personnel	350:1	350:1	350:1
7. Maintenance Personnel	As appropriate	As appropriate	As appropriate
F. District Leadership/Supervisory Personnel			
1. General administration	**Essential**	**Essential**	**Essential**
2. Instructional and curriculum	**Essential**	**Essential**	**Essential**
3. Fiscal	**Essential**	**Essential**	**Essential**
4. Facility maintenance	**Essential**	**Essential**	**Essential**
5. Transportation	**Essential**	**Essential**	**Essential**
6. Food services	**Essential**	**Essential**	**Essential**
7. Extra-curricular	**Essential**	**Essential**	**Essential**
8. Professional development	**Essential**	**Essential**	**Essential**
G. State-funded supplemental delivery system strategies			
1. Independent study and other educational options	**Essential**	**Essential**	**Essential**
2. Post secondary options			**Essential**
3. Virtual schools (Internet)	**Essential**	**Essential**	**Essential**
4. Distance learning	**Essential**	**Essential**	**Essential**
5. Closed circuit TV	**Essential**	**Essential**	**Essential**
6. Independent study and other education options	**Essential**	**Essential**	**Essential**
7. Public television	**Essential**	**Essential**	**Essential**
8. Cooperative agreements with neighboring districts	**Essential**	**Essential**	**Essential**
9. State-supported joint centers for special curricular areas	**Essential**	**Essential**	**Essential**